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The Use of a New Phenanthridinium Compound 1553 in the Treatment of Trypanosoma Congolense Infection in Cattle

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INTRODUCTION

The chemotherapy of *T. congolense* infection, a disease of cattle which has proved to be extremely refractory to drug treatment, has been advanced very considerably within recent years by the use of the phenanthridinium compounds discovered by Morgan and Walls (1938).

Browning *et al.* (1938) showed that one of these compounds (S.897), 3-amino-9(p-aminophenyl)-10 methyl phenanthridinium chloride, was trypanocidal both to *T. brucei* and *T. congolense* in mice, administered subcutaneously in a dosage of 1 mg. to a 20 gramme mouse. This dosage approached the maximum tolerated dose (*i.e.*, the therapeutic index is low). Subsequently Browning *et al.* (1940) repeated their work and showed that the phenanthridinium compound S.897 was curative against *T. congolense* in much smaller quantities than they had reported previously, a dose of S.897 of $\frac{1}{15\text{–}20{,}000}$ gramme curing all of seven mice infected with their Strain I *T. congolense*, and all of three mice infected with their Strain II *T. congolense*. Much smaller amounts than this, *i.e.*, $\frac{1}{75\text{–}100{,}000}$ gramme, proved to be effective against Strain I.

The therapeutic action of S.897 against *T. congolense* in cattle has been investigated in East Africa and reported on by Hornby *et al.* (1943) and by Carmichael and Bell (1944). The compound was proved to have a high place among the trypanocides acting against *T. congolense*. The main drawbacks to the routine use of S.897 in the field are: (1) Its solubility is low and consequently the curative dose is bulky. (2) A single dose does not necessarily produce cure and repeated subcurative doses quickly produce drug-fastness in the trypanosomes. (3) The best method of administration is the intravenous route which is a difficult technique for African staff in the field.

Recently we have received a small quantity of a new phenanthridinium compound (1553) chemically related to S.897, this being 3:7-diamino-9 phenyl-10 methylphenanthridinium bromide. The 1553 compound is stated by Browning (1944), in a private communication, to be more active in smaller doses against *T. congolense* in mice than S.897, and to cause less induration of the tissues at the site of injection.

Phenanthridinium compound 1553 is a purple crystalline product which produces a port-wine coloured solution in distilled water. At room temperature a solution of about 1 per cent. weight by volume can be obtained, but it is much more readily soluble in hot water, a 2 per cent. solution then being obtained fairly easily. The more concentrated solutions remain stable on cooling.

TREATMENT

The cattle used on these experiments were all Zebus and they had never had trypanosomiasis previous to their experimental infection by the subcutaneous inoculation of infective blood. Throughout the experiments three different strains of *T. congolense* were used, all of which had been isolated recently from naturally infected cattle. All were of a virulent type.

EXPERIMENT I

A group of 20 cattle was infected, and when they were seen to be showing marked symptoms of *T. congolense* infection (anaemia and loss of condition) and numerous trypanosomes were present in the peripheral blood, they were treated according to the following table. A sterile aqueous 2 per cent. solution of 1553 was used and the computed dose was equivalent to 2 mg. of the drug per kilo live weight.

TABLE I

No. of Zebus	Route of Administration	Cures	Relapses
4	Intramuscular	4	–
12	Subcutaneous	8	4
4	Intravenous	4	–

The trypanosomes disappeared from the peripheral blood within 24 to 48 hours of treatment. The four relapses, which occurred between the 13th and 24th day after treatment, were again treated with the same dosage subcutaneously and they were all cured.

Cure was considered to have occurred when thick blood films examined daily over a period of four months, revealed no trypanosomes, the blood returned to normal, the animals improved in condition and subinoculations into mice proved negative. The subinoculations to the mice were made subcutaneously and intraperitoneally with the pooled blood of the treated cattle, and none of the mice showed trypanosomes. A similar batch of mice inoculated with pooled blood from untreated control animals were readily infected.

The intramuscular inoculations produced a marked reaction at the site of inoculation in every case—a painful swelling which produced marked lameness—and in most cases there was a rise in temperature. The swelling developed a few days after the inoculation and persisted for at least a fortnight, causing the animals great discomfort. Even after the inflammatory reaction had subsided the lesion remained swollen and indurated. When the intramuscular injection was divided over two sites the local reaction remained severe. There was never any sloughing.

The intravenous injections proved to be difficult, mainly on account of the dark-red colour of the solution which made it difficult to be sure when the needle was definitely in the vein. Small quantities of the drug in some cases gained access to the perivascular tissue and caused swelling and later induration, but never sloughing.

Subcutaneous injection, on the other hand, produced only a very slight local reaction and in only two out of the 18 animals so treated was there any noticeable local reaction. The swelling was slight and soon subsided and produced no systemic reaction.

EXPERIMENT II

In view of the favourable results, of the ease of administration, and of the very slight reaction obtained in Experiment I when the phenanthridinium compound 1553 was administered subcutaneously, a further 19 head of cattle were treated by the subcutaneous route using varying doses and different strengths of the solution. This group of cattle were all Zebus and they were affected with chronic *T. congolense* infection.

The following table (Table II) shows the mode of treatment.

TABLE II

Dose: mg. per kilo Body Weight	Percentage Solution 1553			
	2 per cent.		1 per cent.	
1·0	4	4 C.	4	4 C.
1·5	4	4 C.	4	4 C.
2·0	–	–	3	3 C.

C = Cure.

Thus of 19 animals treated with 1553 all were cured. The criteria of cure adopted for the animals in the first experiment were used.

In this series of animals the subcutaneous inoculations were given in varying ways.

(*a*) The dose was injected in one site and not massaged.

(*b*) The dose was injected in one site and massaged thoroughly.

(*c*) The dose was divided over two sites (one on each shoulder) and not massaged.

(*d*) The dose was divided over two sites and massaged.

Only in one case did the inoculation produce any local reaction and that was in an animal which received the 1 per cent. solution of 1553 at one site and was unmassaged.

Discussion

The results of this limited series of experiments show that the phenanthridinium compound 1553 has extremely high trypanocidal powers against *T. congolense* in cattle. Of 39 cattle treated only four relapses occurred and they were cured by a second subcutaneous inoculation.

In eight animals out of eight cure was obtained in a dosage equivalent to 1 mg. of the drug per kilogram body weight. The limited amount of drug available for trial prevents us reporting on the activity of smaller amounts than this, but even at this dosage it is apparent that the therapeutic action of the phenanthridinium compound 1553 is greater than the related compound S.897.

We have been unable to investigate in detail the toxicity of the phenanthridinium compound 1553 for cattle. Our observations lead us to believe that it is of low toxicity and that its therapeutic index will be large, and therefore the risk of an overdose will be small.

The results of various modes of administration show that the subcutaneous route produces only very slight local reaction which could be neglected in the field use of the drug. This fact is a great advantage over S.897 which produces a marked reaction when inoculated subcutaneously. The degree of irritation produced by 1553 when injected intramuscularly appears to be greater than S.897.

We are unable to account for these different effects of intramuscular and subcutaneous injections of 1553, for its action seems to be the reverse of the normal action of drugs, *viz.*, the subcutaneous effects are usually much more severe than those produced by intramuscular injection.

The phenanthridinium compound 1553 therefore appears to fulfil all the objects of a therapeutic agent for use in the field.

(*a*) It has a high trypanocidal action.

(*b*) Since doses up to twice the therapeutic dose are not toxic it could be administered by Africans using a dosage computed on estimated weight.

(*c*) The volume of the dose is small since it is readily soluble.

(*d*) A single dose produces sterilisation in most cases.

(*e*) It can be administered easily, *i.e.*, by subcutaneous injection.

Summary

1. The phenanthridinium compound has a marked therapeutic action against *T. congolense* in cattle.

2. It can be administered by the subcutaneous route.

Acknowledgment.—The phenanthridinium compound 1553 used in these experiments was supplied to us by the Chemical Research Laboratory of the Department of Scientific and Industrial Research, Teddington, Middlesex, where it was prepared.

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EFFECT OF WHEAT GERM OIL ON THE FERTILITY OF BULLS

To determine the effect if any of feeding wheat germ oil* to the bulls of the New York Artificial Breeders' Co-operative, Inc., of Syracuse, N.Y., the authors selected 20 of the 28 bulls in use. The test bulls were either Holstein-Friesians or Guernseys and had been as nearly equal as possible in respect to breeding performance for the prior three months. Data on average volume of semen, motility of spermatozoa, and spermatozoa count were obtained. The bulls were divided into two groups of ten bulls each by lot (flip of a coin) to decide which group was to be treated and which kept for controls. The hay and concentrates were assayed for vitamin E potency with rats at different times during the trial. The treated group received, for one year, 1 oz. daily of wheat germ oil certified to contain two Evans rat units of vitamin E per gramme. The number and volume of ejaculates, motility, number of spermatozoa, and average service time were tabulated. Over 8,200 cows were inseminated and more than 1,250 semen samples examined during the year. Bluntly told, the results were negative. There was no increase on any score, and the seasonal variations in sperm motility were the same in both groups.—*J.A.V.M.A.*

* G. W. Salisbury, Department of Animal Husbandry, Cornell University: Controlled Experiment in Feeding Wheat Germ Oil as a Supplement to the Normal Ration of Bulls Used for Artificial Insemination. *J. Dairy Sci.*, **27** (July, 1944): 551-562.

Adult Vaccination Against Brucellosis in Cattle*

Brucellosis (Bang's disease—infectious abortion) remains one of the major hazards to the livestock industry in the United States. It causes large financial losses in infected herds and constitutes a threat of the first magnitude for every herd of brucella-free cattle and swine in the country. In addition, brucellosis, under the name of Malta fever or undulant fever, constitutes a public health problem; the extent and importance of which is not generally appreciated. That it is a serious hazard to the health of individuals and communities has been shown by Jordan,[1] Harris[2] and others.

These facts and the absence of any simple, effective means of controlling the disease have led to the over-enthusiastic reception by cattle owners of any scheme which appeared to offer some promise for control before it was subjected to critical experimental test. Unfortunately, it also has made possible the exploitation of many herd owners by unscrupulous interests through the sale of so-called cures.

Control Procedures for Brucellosis Now in Use

The procedures now generally accepted by the veterinary profession as most valuable for the control of brucellosis are :—

(1) Test and immediate elimination of reactors.

(2) Test and immediate elimination of reactors, together with calfhood vaccination.

(3) Test and gradual elimination of reacting animals, together with calfhood vaccination.

In many states indemnities are paid when plans 1 and 2 are used, as a means of minimising financial losses to the herd owner. In all cases, the plan used should be accompanied by intelligent herd management to minimise spread of the infection.

A combination of these methods may be the most effective means for control in the opinion of Birch.[3] His experienced judgment on this question is ably set forth in the following quotation :—

"I place emphasis on the combination because our tendency has been to rush from one method to another, attempt to apply each method to all herds in all circumstances, then to commend or condemn, retain, or abandon, according to our individual experiences. These experiences have depended in turn, not chiefly on the potentialities of the method itself, for each is useful in its place, but on the circumstances under which it has been used. We have not yet attained the flexibility which enables us to suit the method to the conditions in the individual herd, though in the setting up of the plan involving test and hold with vaccination of the calves as indicated a step has been made more important, perhaps, than is yet fully realised."

Under the programme to control and eradicate brucellosis in cattle by test and slaughter, much progress has been made. On October 1st, 1943, approximately 2,200,000 herds, containing about 16,800,000 cattle, were under supervision (Donham *et al.*[4]). About 846,000 cattle, located in 40,500 herds in 41 states, are fully accredited brucellosis-free. The farmers in 717 of the 3,071 counties of the United States have chosen the area plan of control for brucellosis in cattle; this represents over 23 per cent. of the counties.

In December, 1940, calfhood vaccination with strain 19 was approved as a part of the official control programme for brucellosis in cattle. About 442,000 calves have been vaccinated under official supervision since January 1st, 1941. Calfhood vaccination can be considered as an important advance in the overall programme for eradication of this disease, but not as a substitute for other methods of control. The best experimental evidence indicates that it must be supplemented by other methods if the disease is to be effectively handled.

The most recent proposal is the use of strain 19 for the vaccination of mature cattle and calves over eight months of age. In some states this method is now being employed under official state supervision in certain types of infected herds. However, adult vaccination with strain 19 is being used by veterinarians and laymen alike in many herds that are not under official supervision, and in some cases, under circumstances which can lead only to unfortunate results for the herd owner and possibly for public health.

The Vaccination of Adult Cattle with Strain 19

Since Cotton, Buck and Smith[5] reported that vaccination of calves aged four to eight months with strain 19 of *Brucella abortus* offered a promising means of producing a state of resistance to subsequent infection with more virulent strains of this organism, numerous investigators have confirmed their observation (see Huddleson

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While resistance thus established is not sufficient to protect against later exposure to virulent strains of Brucella under all conditions, it is serviceable and calfhood vaccination, when used in connection with other methods of control, is now officially recognised as a valuable tool in the control of this disease. (Donham *et al.*[4])

The success attained with calfhood vaccination has stimulated a demand by cattle owners, especially those who are experiencing heavy losses from brucellosis, for vaccination of mature cattle in such herds. Unfortunately, there is relatively little critical information on the vaccination of adult cattle, and calves over eight months of age, with strain 19. While such evidence as is available would indicate that adult vaccination may have a place in control of brucellosis under certain conditions, much more information is needed before widespread use of adult vaccination can be recommended.

Haring and Traum[7] report that beneficial results have been obtained in eliminating brucellosis by use of strain 19 vaccine on adult cattle in certain experimental herds in California. When vaccination with strain 19 was begun in 1933 in the San Quentin prison herd, 17 unbred heifers between 12 and 32 months of age were vaccinated. Though badly infected at that time, this herd was apparently free of Brucella infection in 1941. If vaccination had been limited to calves between four and eight months of age and the older, susceptible heifers left unvaccinated, the authors are convinced that eradication of the disease would have been delayed; and that under the circumstances, the project might have been a complete failure.

From clinical observations in infected herds, Lothe[8] states that vaccination of sexually mature, Brucella-negative cattle is a useful tool in controlling this disease under certain conditions. In his judgment, adult vaccination should be used only in herds where infection is active, as a means of hastening the process of building up herd immunity to the point where the disease can be eliminated from the herd.

Where sexually mature cattle are vaccinated, the owner must be prepared to accept certain disadvantages and losses. Cattle vaccinated as adults remain positive to the blood test over relatively long intervals, and a considerable percentage fail to return to a negative status. Since legal restrictions bar the movement of cattle while they remain positive, the owner must be prepared to face this hazard if he resorts to adult vaccination. Another handicap to adult vaccination is that some health regulations permit only milk from brucellosis-free herds to come into the market.

Public Health Aspects of Adult Vaccination

While it seems well established (Rabstein and Welsh,[9] and others) that vaccination of calves under nine months of age does not result in the establishment of the Brucella organism in the udder, such information has not been clearly established for animals vaccinated as adults. While the meagre, circumstantial evidence available would indicate that strain 19 is of low virulence for the human, adequate safeguards against the possibility of infection with this organism should be provided until such time as it is definitely established that strain 19 is not dangerous for man.

A greater hazard to human health from the use of strain 19 in the vaccination of adult cattle lies in the fact that cattle so vaccinated remain positive for long periods, a large percentage even permanently. Since the agglutination test is inadequate in differentiating between infection resulting from strain 19 and infection from more virulent strains of Brucella, cattle infected with more virulent strains may be retained in herds where adult vaccination is practised. The milk from such cattle may constitute a real hazard to human health. Consequently, where adult vaccination is employed, provision should be made for careful pasteurisation of milk from such herds. Cattle vaccinated as adults should be permanently identified and managed in the same manner as cattle showing positive reactions to the agglutination blood test for brucellosis and in accordance with state and federal regulations.

Recommendations Concerning Adult Vaccination

The ultimate goal of the livestock industry should be the elimination of brucellosis from the animal population. To accomplish this, the industry must make judicious use of the best methods of control now known, imperfect as they are, and support a vigorous research programme aimed at the development of more effective ones. The intelligent use of strain 19 vaccine should contribute materially to this end.

On the basis of existing knowledge, which is far from adequate, the Committee offers the following recommendations: —

(1) In "problem herds" in which it has been impossible to eliminate brucellosis by the test and slaughter method, it is suggested that all calves and Brucella-negative, non-pregnant animals be vaccinated. The vaccination of the mature cattle should be used only as a means of elimination of the disease from the herd and not as a permanent programme. Such vaccination should be under the supervision of a qualified veterinarian and in accordance with the programme in effect in the state. Such cattle should be handled as reactors in accordance with state and federal regulations.

(2) In herds where there is rapidly spreading, active infection with a high percentage of reactors that are being retained and in which calfhood vaccination is being practised, the question of vaccination of negative adult non-pregnant animals should be left to the wisdom of the veterinarian. The procedure to be followed in such cases should be governed by the conditions existing in that locality, and in accordance with state laws.

(3) The use of strain 19 in adult cattle should be discouraged in brucellosis-free herds and particularly in herds where an attempt is made to keep the herd free from animals that react positively to the blood serum agglutination test. In the light of existing information, the vaccination of adult animals should not be practised in herds in brucellosis-free accredited areas, in modified accredited areas or in areas in the process of being accredited.

(4) The committee commends the U.S. Bureau of Animal Industry for the supervision that it is giving to the production of strain 19 vaccine and recommends that this supervision be continued.

(5) In view of the perishable nature of strain 19 vaccine and the public health aspects of brucellosis, it is recommended that ways and means be developed to establish supervision over this product during its storage, distribution, and use. This should include careful supervision during transportation of the product. The aim of such supervision should be to ensure a satisfactory standard of viability of the vaccine at the time of its use, and also to prevent undue exposure to the organism by those who are not acquainted with the possible hazards it presents to human health.

In making these recommendations, the Committee wishes to emphasise that adult vaccination should be considered only as an expedient to tide over difficult situations in particular herds, especially in times when it is essential to maintain production of milk and meat. According to such published and unpublished data as are available, the use of adult vaccination may bring about a decreased incidence of brucellosis in heavily infected problem herds. In such herds, it should be used but once—and then should be followed by a programme of calfhood vaccination. This plan should permit owners of heavily infected herds to work toward a brucellosis-free status with minimum financial sacrifice.

Research Must Point Way to Better Control Methods

Research must point the way to new and more effective methods of control, and the Committee emphasises the great need for an enlarged research programme on brucellosis. We have every confidence that from such research will emerge facts that will lead to the development of more effective means of control than those now available. The magnitude of the problem, its importance to the livestock industry, and the public health aspects of brucellosis make such a programme imperative. The expenditure of relatively small sums for research to-day may mean the saving of millions of dollars to the industry to-morrow and the removal of a public health hazard, of the importance of which the public is not yet fully cognisant.

The Committee recognises that strain 19 vaccine, in its present state of preparation, is not an ideal immunising agent and that the livestock industry would be greatly benefited if an immunising agent were developed that would produce a more solid and lasting immunity and without producing a positive agglutination reaction. Research in the following fields, among others, is recommended :—

(1) Continuation of present studies, and initiation of new ones, designed toward the development of agents, including non-living ones, that will produce a more solid and lasting immunity than that resulting from strain 19; and which will be effective for cattle, swine and other species.

(2) Determination of the optimum conditions for maintaining the viability of strain 19 vaccine, or improved immunising strains that may be developed.

(3) An investigation of methods which will maintain the highest immunogenic properties of any strains used for immunising purposes, including strain 19. Also an investigation of methods for the utilisation of vaccines.

(4) The initiation of research projects in private herds under farm conditions where state and federal veterinarians are co-operating in the control of bovine brucellosis. These projects should be under the complete supervision and control of research personnel of the previously mentioned agencies, or other designated research agencies. To maintain complete supervision and control in such herds, sufficient funds to take care of the necessary expenses should be provided. Such projects should include studies on : (*a*) brucellosis-free herds; (*b*) herds where infection has just entered; (*c*) herds in which brucellosis is well established; and (*d*) herds co-operating in official federal-state programmes for calfhood vaccination, but in which reactors are retained.

(5) The greater development of research on brucellosis of swine, especially as it relates to brucellosis in cattle and to the public health.

(6) The collection and compilation of more complete information on the public health aspects of brucellosis.

A campaign for the education of the public on the importance of the brucellosis problem should go hand in hand with the steps set forth in the previous recommendations. An enlightened public will be more sympathetic to the application of necessary methods of control, and will be more willing to support a constructive programme of research and control. The veterinary profession and livestock associations should encourage and stimulate this programme to the fullest extent. Solution of this problem will require the fullest co-operation between veterinarians, herd owners, organised representatives of the cattle industry, and public health officials.

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"LIVESTOCK IMPROVEMENT THE KEY"

The Minister of Agriculture, Mr. R. S. Hudson, addressing the 62nd meeting of the Council of Agriculture for England, said he was particularly glad to see that they had before them a memorandum of his Department on livestock policy. If he were to try to sum up that policy in a word or two he would say, "Seek quantity through quality." Livestock improvement was the key. The increased numbers of stock that we should need would follow automatically. The grading-up of any herd depended on the good qualities of the bull, and the consistent use of a bull of the same breed. He was proposing to alter the licensing system so as to differentiate between beef and dairy bulls, and, in the case of dairy bulls, to make the milk records of his ancestors, as well as conformation, a prerequisite for a licence.

Artificial Insemination

They must, said Mr. Hudson, exercise close supervision and control over artificial insemination. Anyone might use artificial insemination within his own herd, but, apart from this, no part of the process of artificial insemination could legally take place except under licence and with the Minister's specific authority. The regulations laid it down that he should satisfy himself that the stock, premises, equipment, staff and methods at any centre were satisfactory before a licence was issued. To advise him on these matters and about artificial insemination generally he had appointed a Central Advisory Committee. Their ultimate object was to develop artificial insemination centres so that they would provide a national service organised on behalf of the livestock industry. To ensure this they had decided that in future licences to operate centres will normally only be granted to producer-controlled organisations, such as Cattle Breed Societies, Farmers' Co-operative Societies and the Milk Marketing Board. Moreover, they proposed to make it a condition of the licence that the centre's facilities would be available to all cattle breeders within its area of operation.

"I feel strongly," added the Minister, "that though artificial insemination holds out great possibilities for the future, we must in the present state of our knowledge proceed with caution. There would be a very considerable danger in too rapid development. We cannot, therefore, expect artificial insemination to provide an immediate solution to our livestock improvement problems. In any event the shortage of qualified veterinary and other staff, the lack of suitable buildings and the difficulty of erecting new ones would limit any rapid extension of the process in the near future. I would therefore like to stress that although I have great hopes of artificial insemination in the future, it should in no way be regarded as absolving the livestock farmer from taking all practicable steps here and now to grade up his herds and thus secure that improved efficiency in the production of milk and meat upon which the future of the livestock industry depends."

CLINICAL COMMUNICATION

An Attempt to Control "White Scour" of Calves with Sulphaguanidine

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During the spring of 1944 an outbreak of diarrhoea followed by rapid death occurred in calves on a certain farm. By March 20th all the calves born since early February had died except one, although all had had 10 ml. *B. coli* antiserum injected at, or soon after, birth. Careful *post-mortem* examination of three calves which died that day showed few macroscopical changes but bacteriological examination revealed the presence of *Bact. coli* (haemolytic type) in every organ tested (heart, spleen, kidney, liver, long bone). Portions of spleen and long bone were sent to R. F. Montgomerie at the Wellcome Physiological Research Laboratories who confirmed this finding and stated that the strains isolated belonged to his types A and B and were not markedly virulent.

This outbreak appeared, therefore, to be one of classical "white scour" due to a haemolytic strain of *Bact. coli*, and in view of the value of sulphaguanidine in human dysenteries and more particularly because of evidence of its efficacy in this type of calf disease reported by several authors (Thorp and Shingley (1942), Wise and Anderson (1942) and Thorp (1943)) it was decided to employ this drug as a therapeutic agent.

During the period of the experiment eight heifers and seven bull calves were born on the farm and six apparently normal bull calves from five farms where no losses had occurred were added. The eight heifers each received 20 ml. *Bact. coli* antiserum subcutaneously at birth and two were treated with sulphaguanidine when they showed evidence of illness. The other six were not treated except for further injections of serum. The bull calves did not at any time receive serum and when they became ill, eight were dosed with sulphaguanidine while five remained untreated.

As each animal died it was fully examined *post-mortem* and in nearly every case pure cultures of a haemolytic type of *Bact. coli* were recovered from all the organs. No other pathogenic organism was ever isolated from any site in the body.

The calves weighed approximately 50 lb. and the dosage of sulphaguanidine was that suggested by Brownlee (1944), *viz.*, 1·5 g. twice a day. After three calves dosed at this level had died, the dose was doubled, thus approximating to that given by Thorp and Shingley (1942). This dose did not appear to be toxic since no evidence of nephritis could be found on *post-mortem* examination.

The complete results are given in Table I and show that the drug completely failed to effect a cure of the condition at this farm.

Table I

Treatment	No. of Calves	Died	Lived
None	5	4	1
Serum alone	6	5	1
Serum + Sulphaguanidine 3 g. b.i.d.	2	1	1
Sulphaguanidine 1·5 g. b.i.d. ...	3	3	0
Sulphaguanidine 3 g. b.i.d. ...	5	5	0

We are indebted to Burroughs Wellcome and Co. and to Imperial Chemical (Pharmaceuticals), Ltd., for supplies of sulphaguanidine.

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The Pedigree Livestock Committee of the Red Cross Agriculture Fund announces that at present it has gathered £136,500, over £12,000 accruing in October. Sales of Shorthorns at Penrith and in Scotland in 1944 have raised £19,645 which with the sum of £13,460 secured by the Shorthorn Society in 1943 makes a total of £33,105 from breeders of "the red, white and roan."

ABSTRACTS

[The Response of the Bovine Ovary to Pregnant Mares' Serum and Horse Pituitary Extract. FOLLEY, S. J., and MALPRESS, F. H. (1944.) *Proc. Roy. Soc.* (Ser. B.) **132**. 164-188.]

Despite the rather extensive use of gonadotrophic hormones for clinical purposes during the last few years, it is remarkable that there are so few detailed studies of the changes induced in the bovine ovary by the administration of these hormones. This paper by Folley and Malpress is a noteworthy contribution to filling this gap in our knowledge. These workers have studied the quantitative, as well as the qualitative response of the cyclic bovine ovary to single subcutaneous injections of P.M.S. and of horse pituitary extract, and many of their findings are of direct clinical interest. The results of this study make it clear that in cattle, ovarian weight is a very unsatisfactory criterion of response to gonadotrophic action. Criteria such as mean follicular diameter and percentage of large follicles proved better suited for accurate assay, *i.e.*, the response is best recorded by considering the follicle rather than the whole ovary as the unit of measurement. It is shown that the action of P.M.S. is relatively prolonged, reaching its maximum gonadotrophic effect in 14 to 21 days after injection. In view of this it is unlikely that the effect of P.M.S. injections would be enhanced by subdivision of the dose. Horse pituitary extract, on the other hand, is probably inactivated in the body much faster than P.M.S., and the follicular response to this hormone would probably be enhanced if divided injections are given. The threshold dose of P.M.S. for quantitative effects was found to be between 1,000 and 2,000 i.u., whilst the maximal rate of stimulation was probably reached with doses of from 3,000 to 4,000 i.u. Qualitative changes observed included multiple ovulation, an ovulatory luteinisation, the formation of abnormally small corpora lutea (P.M.S. only), and the occurrence of haemorrhagic follicles; an effect caused by horse pituitary injections only was the rupture of a single follicle within one or two days of treatment ("shock effect"). Though, under conditions in which ovulation does not occur, high single doses of P.M.S. can cause such excessive follicular growth that the ovaries are transformed into a mass of large follicles resembling cysts, studies made in the present investigation clearly indicate that such ovaries eventually return to a normal condition; this fact, taken in conjunction with histological evidence, indicates, therefore, that such ovaries should not be regarded as cystic in the accepted sense of the word.

This study has revealed a clear distinction between the biological properties of P.M.S. and horse pituitary extract as regards the induction of ovulation. With doses of P.M.S. up to 4,000 i.u. induced ovulation was only observed when the injections were made during the follicular phase of the oestrous cycle, that is, when the oestrogen production of the ovary was increasing and when, according to current views, the output of pituitary luteinising hormone was undergoing an increase. It seems likely, therefore, that in this case ovulation was due to the intervention of pituitary luteinising hormone secreted in response to the stimulus of circulating oestrogen. On the other hand, ovulation was induced (not invariably, however) by horse pituitary extract injected during all stages of the cycle. The results obtained with horse pituitary extract further differed from those with P.M.S. in that with the former, ovulation, in many cases, followed injection much more quickly than was the case with P.M.S. The authors, therefore, suggest that horse pituitary extract can cause follicles to ovulate without the co-operation of the host animal's own pituitary, provided they are in a sufficiently advanced state of development; this fact is explicable on the view that the horse pituitary contains a high amount of the luteinising factor. Finally, Folley and Malpress emphasise that the wide individual variations in the follicular response of the bovine ovary to gonadotrophic stimulation, encountered in their work, must give pause to endue enthusiasm regarding the practical use of equine gonadotrophin for the treatment of anoestrum in cattle. They point out that though it would be unsafe to draw detailed conclusions from their results, which refer to cyclic ovaries, as to the mode of response of the inactive ovaries of anoestrous heifers, it seems safe to conclude that rather variable results are to be expected in field use. On the basis of present knowledge, 2,000 i.u. P.M.S. would appear to be the upper limit of dosage which can safely be used; with higher doses the danger of superovulation must be real.

N. J. S.

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Calfhood Vaccination Against Brucellosis in the Province of Quebec. TRUDEL, F. (1944.) *Canad. J. comp. med.* **8**. 97-101.]

The results are given of a plan of calfhood vaccination with strain 19, which has been in vogue for four years. Eradication by blood-testing and isolation is, however, encouraged where the incidence of contagious abortion is found by blood test to be less than 10 per cent. Of 3,684 herds under supervision, 350, or 9·5 per cent., have been placed on calfhood vaccination. As these are widely distributed in the counties, this figure fairly represents the incidence of the disease in the Province.

Calfhood vaccination is carried out free of charge, but the veterinary surgeons doing the inoculations are entitled to introduce any measures deemed advisable to ensure the best results, *e.g.*, recording, ear tagging, blood sampling, etc. Calves are usually vaccinated when from four to eight months old, but in some cases they are as old as 10 to 12 months. They are ear tagged and blood-tested one month before and one month after inoculation. If no agglutinins are found at the second test the animal is re-vaccinated. Mixing of vaccinated calves with reactor adults is encouraged.

To save time and labour the custom of breeding only spring calves is encouraged so that vaccinations may be carried out more or less together in autumn.

Out of 1,500 vaccinated animals which had subsequently reached their first or second lactation, 13, or 0·85 per cent., aborted; 179, or 40 per cent., of 4,500 developed no agglutinins and had to be re-inoculated. Possibly this high figure is explained by deterioration of the vaccine due to delay in transit or in using it once it has reached the practitioner.

Twelve reacting calves were inoculated of which seven calved normally, one aborted and four were not pregnant. Of 16 calves which had a fluctuating titre after vaccination (considered to be an "exposure reaction") four aborted. The persistence of agglutinins in the blood after vaccination is variable. The titre of most calves fell below 1/100 three to four months after vaccination, and in some cases it persisted at the lower level of 1/50 or 1/20 up to and even after calving. The agglutinin titre does not necessarily indicate the degree of immunity. A high titre after vaccination merely indicates that the vaccine was potent and was used with the minimum of delay.

It is of interest to note that two-thirds of the vaccinated animals which developed a fluctuating titre or aborted had been vaccinated when five or six months old, which supports the contention of the authors that six to eight months is a more suitable age for inoculation.

N. S. B.

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[Protein Hydrolysates in Intravenous Alimentation. GAUNT, W. E. (1944.) *Nutr. Abstr. Rev.* **13**. 501-507.]

The observations, which are the subject of this review, show that when hydrolysed protein (*i.e.*, protein split up into its constituent amino-acids by some suitable means, such as digestion with acids or enzymes) is administered intravenously it can be metabolised at least as well as the intact protein given orally. Such hydrolysates given intravenously can therefore be used as temporary expedients to supply the nitrogen requirements of the body when the alimentary tract cannot be used, just as glucose is administered in these circumstances to meet the energy needs. The procedure adopted for the human subject is to inject intravenously a 2·5 per cent. protein hydrolysate and a 10 per cent. glucose solution at a rate of about 300 to 500 ml. per hour, one to two litres being given daily. (The glucose must be given simultaneously with the protein hydrolysate in order to prevent the latter from being wastefully used merely as a source of energy.)

Preliminary work has shown that mixtures of pure amino-acids can be used intravenously instead of protein digests to meet the body's nitrogen requirements. The possibility of using mixtures of limited numbers of crystalline amino-acids in place of complete protein digests is attractive, but a considerable amount of research has still to be done, at least before such mixtures could be used with assurance for human therapy, in the determination of what constitute essential and non-essential amino-acid.

By eliminating the processes of digestion and absorption, intravenous injection of protein hydrolysates has proved to be a sound physiological method of dealing with the alimentation of human subjects in a wide variety of pathological conditions. The clinical evidence so far obtained has shown that the intravenous administration of such materials can be helpful when oral feeding is impossible, difficult or ineffective. In the conditions obtaining after surgical procedures, haemorrhage and burns, in which the demand for protein is greater than normal, the digests can also be used effectively either alone or as supplements to the proteins of orally digested foods.

[It is suggested that, if either protein hydrolysates or mixtures of the pure amino-acids could be made commercially available and ready for immediate use, such preparations would have a useful veterinary application in small-animal practice.]

N. J. S.

Questions and Answers

"Questions and Answers" will be published on alternate weeks.
The submission of questions for inclusion in this column will be welcomed. They can relate to any aspect of veterinary work and where publication of the name of the enquirer is not desired, a pseudonym should be supplied, the name and address also being given.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Post-parturient Paralysis of the Bovine

Q.—*What treatment should be prescribed for a cow which, following a difficult calving or an attack of milk-fever, loses nervous control of the hind limbs and is unable to rise? Can you suggest a method of applying slings so that the patient does not "hang" in them?—W. B. Quarmby.*

A.—Before commencing treatment of a case of this nature it is essential that a thorough examination of the patient should be made in an attempt to arrive at a correct diagnosis. A careful history should first be obtained, particularly with regard to the time taken to calve, whether the calf was particularly large and the patient needed much assistance, whether the patient has been on its feet since it calved and also as to whether there was evidence of staggering or tetany prior to the onset of the paralysis. When examining the patient the possibility of fracture of the pelvis or femur, or degeneration of the tendo-Achilles should be borne in mind. In the absence of such a definite cause it should be decided whether the patient is likely to be suffering from a calcium deficiency, hypomagnesaemia, or acetonaemia, or a combination of two or more of these conditions, and treatment prescribed accordingly. In view of the prevalence of calcium deficiency in recently calved cows it is advisable always to administer calcium borogluconate when there appears to be no other obvious cause of the paralysis, and if necessary to combine glucose and a magnesium salt in the injection. If calcium therapy has already been prescribed without obvious effect, udder inflation will frequently be found to be beneficial. Although this latter mode of treatment may be thought to be empirical, its practical value is still well recognised by the practitioner.

Nursing is of far greater importance in the treatment of post-parturient paralysis than in any other disease of the bovine. When first visited the patient may be found to be recumbent in an open field and it may be necessary to apply immediate treatment on the spot. If necessary, protection from wet and cold should be given by means of straw and sheeting, etc., and in very bad weather it may be decided to build a temporary enclosure with the aid of gates or poles and a stack-cover. If the patient appears likely to remain recumbent for very long, however, it is very advisable to arrange for her removal to a covered yard or large loose-box on the farm. This may be accomplished by rolling the cow on to a five-barred gate, securing her to it with a rope, and dragging with a tractor or horse. If a long distance has to be covered the owner should be advised to obtain the services of a motor-lorry or cattle-truck, choosing a vehicle which is low to the ground and has large doors which "let down" behind, and the cow should be pulled on to the vehicle by five or six men with ropes. When housed, care must be taken to provide plenty of straw and if the patient is found in a byre with a deep gutter, protection from injury should be afforded by means of excess bedding. It is very important that the patient should be maintained in a natural lying position, and if necessary she should be propped-up on her brisket by means of sacks tightly filled with straw pressed in against her shoulder. Discretion in their use, however, should be used by the attendant, as some patients show a tendency to lie on such sacks, the latter thereby defeating their object. Two of the most serious sequelae to faulty nursing, and by no means uncommon, are cramp and bed-sores. It is therefore very important that the patient should be turned over from side to side every three or four hours. At the same time massage should be applied to the muscles of the limb. Massage of the lumbar region with white liniment, or application of mustard or other counter-irritants should also be prescribed.

Apart from specific treatment for mineral deficiency or acetonaemia, care must be taken to maintain the bowels in a lax condition by the preliminary administration of a purgative and repeated doses of a laxative. In this latter connection cattle treacle is particularly useful, its sugar content being of further additional value not only as a food but for its bolstering effect on the liver against toxaemia. Other medicines which may be prescribed include carminatives, stomachics and stimulants and at discretion, strychnine, arsenic and iodides should be prescribed for their effect on the nervous system. Treacle, as already described, and strong coffee are useful vehicles for such medicine.

During the course of the illness the condition of the udder and uterus should be carefully observed for evidence of mastitis or uterine toxaemia and if considered economical, treatment prescribed accordingly. Similarly in the event of retained placenta, manual removal should be carried out as soon as possible.

Food should be of a light laxative nature during the whole time the animal is recumbent, bran, roots, and cut grass being particularly suitable. Plenty of drinking water should always be available and if necessary thirst may be encouraged by placing a little salt into the mouth several times daily.

Even if there appears no obvious cause of the paralysis and provided the patient is of sufficient value for prolonged treatment to be economical, treatment along the lines outlined should be continued for several days. In regard to prognosis, it is a very favourable sign if the patient frequently drags herself about the shed, turns over from side to side unaided, or in attempting to rise is able to support the weight of her body on her hind legs even if only for a short time and only a few inches above the ground. In any case, recovery may take as long as three weeks or more. So far as the use of slings is concerned, the writer is of the opinion that it is impracticable to sling a dairy cow, and even were it possible, slinging would probably provide no useful adjunct to treatment.

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Boro-gluconate Solution: Post-injection (i/m) Sequelae

Q.—*I inject boro-gluconate solution into the gluteal muscles: sterile solution, ready prepared. Careful attention is paid to the prevention of sequelae, in the form of swellings, or abscess. In spite of this, swellings and abscesses do sometimes result. Is there a way of preventing this? Intravenous injection is not always practicable when the cow is not actually down.—W. E. Blackwell.*

A.—It is often difficult to prevent unpleasant sequelae when injecting large quantities of a fairly concentrated solution intramuscularly. The usual precautions are, of course, a help.

The writer always gives the injections subcutaneously in the area over the ribs behind the shoulder. There is plenty of loose subcutaneous tissue in this area, and provided the injection *is* subcutaneous and well dispersed, trouble is unlikely to arise.

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Grass Sickness: Differential Diagnosis

Q.—*Many cases diagnosed as grass sickness in horses are found at post-mortem examination to be other types of colic and* vice versa. *What is the differential diagnosis of grass sickness?—"Student."*

A.—The differential diagnosis of acute grass sickness and impactive colic presents considerable difficulty. In both conditions there is an obturation with a reduction or cessation of defaecation. In grass sickness the whole or part of the large colon is usually involved, whereas in colic the obstruction is usually less extensive and may occur at any part of the digestive tract from the stomach to the rectum. Apart from pain of varying degree at the onset, there is generally absence of violent pain in grass sickness, whereas in colic there is frequently violent pain.

In grass sickness if any faeces are passed or are found on rectal examination, they are of small volume, hard, dry and covered with mucus. Peristalsis cannot be detected on auscultation in grass sickness and purgatives usually fail to produce bowel movement. Most cases of colic respond to purgative treatment.

Since the main symptoms of the two conditions are referable to obstruction of the bowel, there are inevitably borderline cases which are difficult to diagnose on clinical symptoms alone. As a rule the diagnosis is aided by the knowledge that grass sickness occurs commonly in some districts in horses feeding on grass in its early phase of growth. The diagnosis in other places and at other times of the year is difficult and uncertain. An area usually becomes known as a grass sickness area when one or two chronic cases, with the typical "greyhound belly" conformation have been observed.

Until the true pathology of colic and grass sickness are better understood, the clinical symptoms will remain only as helpful but indefinite aids in the differential diagnosis of the two conditions.

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Liberty to Roll in "Colic"

Q.—*Is it dangerous to let a horse with "colic" get down and roll provided he is in a roomy loose-box with plenty of bedding?—"Twist."*

A.—The answer is "No." The late Sir Fred Smith told the writer, in reply to this question, that in his opinion twist of the bowel was anterior in time, in all cases, to signs of pain, *i.e.*, would occur before the veterinary surgeon had seen the patient. He doubted if "twist" was ever caused by rolling, especially during colic. In any case he urged "let your patient roll to his heart's content, so long as he is well bedded down or on grass; if you keep him up, and on the move, you are not only guilty of cruelty

but will lose many through exhaustion, that you would otherwise cure with the relief and rest of recumbency." So let your horse lie and roll, although with hard bitten stablemen of the old traditions you may be hard put to it to persuade them that it is proper procedure.

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Depraved Appetite in Calves

Q.—*What would be the cause and treatment of depraved appetite in three to four month old calves? They chew woodwork in particular, lick clothes, have diarrhoea and are losing condition.*—*"Curious."*

A.—Natural curiosity will lead calves to lick objects and chew abnormal materials, especially if the latter have taste, a salty flavour or are of a pleasant consistency.

Sheer boredom encourages such habits which may become a vice and lead to serious consequences. Light, airy pens where calves can see one another and the things around them, help to nullify this.

A truly depraved appetite is often associated with faulty diets and consequently disturbed digestion. The loss of condition and diarrhoea suggest parasitic infection. The calves should be dosed with phenothiazine (10 to 15 grammes) and removed to fresh quarters 24 hours later. Half per cent. of a mixed mineral mixture consisting of steam bone flour, together with small amounts of the trace elements, and cod-liver oil should be added to the ration.

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Calfhood Vaccination Scheme

Q.—*Would you kindly give me information in regard to this* 1s. *calf inoculation because some farmers think that by signing the post card sent by the Ministry they are going to have their calves inoculated against abortion for the charge of* 1s. *per animal. One farmer told me that he had not signed the post card because at that charge the vaccine would only be a drop of distilled water, and therefore useless. I am under the impression that before the farmer can have the* 1s. *calf inoculation he must have all his stock on the "scheme," the cows at* 12s. 6d. *and the heifers at* 2s. 6d. *Is that correct, or can the farmer compel me to inoculate his calves at* 1s., *although he is not on the "scheme."*—*G. C. Lancaster.*

A.—The Ministry's scheme for vaccination of calves against abortion is quite separate and distinct from the "Scheme for the Control of Certain Diseases of Dairy Stock." Full details of the former scheme have recently been circulated to practitioners by the Animal Health Division.

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CORRESPONDENCE

Boro-gluconate Solution for Milk Fever

Sir,—In *The Veterinary Record* for November 4th, at page 427, there appeared the following questions :—

(a) *What are the ideal proportions of boracic acid and boro-gluconate in the injection?*

(b) *If a stock solution is held in the surgery what is the best preservative, and in what strength?*

(c) *Is there any real advantage in injecting the solution about blood heat, and if so, what is the best method of preparing this?*

"Practitioner."

You invite criticism of the replies given to such questions. I am not wholly in agreement with those that were given in this case and since the matter is one of importance I venture to offer the following short discussion.

(a) The questioner obviously wants the most suitable proportions of boric acid and calcium gluconate (not boro-gluconate). In the original formula which I advised in 1934 I suggested 1½ drachms boric acid to each ounce (*Apothecary*) of calcium gluconate, and this proportion still seems to be employed by commercial manufacturers of calcium boro-gluconate.

In a letter to *The Veterinary Record* (1942, p. 245) I pointed out that because, at that time, there was a scarcity of boric acid in the country the proportion could quite safely be reduced to 1 drachm boric acid to each ounce calcium gluconate.

An excess of boric acid does no harm ; indeed, I originally advised such excess in order to ensure the complete solution of the gluconate and so to avoid the local abscess formation which in the early days of calcium therapy caused us so much trouble, but in light of further experience it now seems unnecessary and wasteful.

(*b*) In the answers it is stated that in preventing precipitation of calcium gluconate boric acid acts as a *preservative*. This is not so ; boric acid prevents precipitation by increasing the solubility of the salt.

The statement that " stock solutions (if properly sterile) will keep for a long time without other preservative [than boric acid] if kept at a fairly warm temperature " is misleading. It is very difficult with the limited facilities available to the average practitioner to ensure that stock solutions of calcium boro-gluconate prepared in the surgery are sterile, especially if these be kept " at a fairly warm temperature." It is therefore desirable to add a suitable chemical preservative otherwise the solutions usually become obviously contaminated because a solution of calcium boro-gluconate is a suitable medium for the growth of moulds.

I have found the following an effective means of preventing such contamination.

Thymol	...	...	1 part
Alcohol (90 per cent.)	...		4 parts

The fungicide should be added to the stock solution in the proportion of two drops to each ounce of solution and thoroughly incorporated by shaking.

(*c*) It is certainly very desirable that the solution should at least be warmed before injection, but the respondent to the question states that he " regards warming as an unnecessary precaution, except perhaps in very cold weather when the solution may be almost freezing "! In such circumstances there surely should be no " perhaps " about it.

The dose of calcium gluconate which Dryerre and I originally advised was 2 ounces. Further experience showed that this dose was too small in cases of milk fever in general, and widely differing doses are now adopted by practitioners as the most suitable in their different districts. This is a very interesting and possibly a significant fact because more precise knowledge of the matter might permit of a correlation being established between the adequate therapeutic amount of calcium in a particular district and the climatic, topographical or other environmental conditions which obtain there. I should therefore be grateful if practitioners would indicate to me (on a postcard) the minimal intravenous and subcutaneous dose of calcium boro-gluconate which in their experience may be expected to effect cure of milk fever.

Yours faithfully,
J. Russell Greig.

Moredun Institute,
Animal Diseases Research Association,
Gilmerton, Midlothian.
November 23rd, 1944.

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The Stuck Metal Plunger

Sir,—Your item, " Questions and Answers," is greatly appreciated. On query, Vol. 56, No. 37, p. 334, " The Stuck Metal Plunger," the following is worthy of trial.

Fill above piston with 10 to 20 per cent. caustic soda solution, hang cone down or put in tumbler full of solution and leave for one or two days. There is no danger of breaking the barrel.

With the season's greetings to you all at home.

Yours faithfully,
R. Paine.

25, Ridge Road,
Pietermaritzburg, Natal.
October 19th, 1944.

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Sir,—Regarding syringe trouble mentioned in your columns recently, on the theory that the metal plunger contracts more than the glass, refrigeration has been used with success.

Where all-glass syringes are affected (as with tissue suspension or blood), if, for example, two needles are cut and the cut ends joined (as by soldering) so as to have one adapter butt at each end, by then applying a second syringe to force air against the opposing end of the stuck plunger it is usually released (depending on the bore of the needles and the size of the pressure syringe, great power is exerted and it is generally in the direction necessary).

Yours faithfully,
" Canad."

Animal Diseases Research Institute,
Hull, Que.
November 9th, 1944.

Weekly Wisdom

". . . *In former times, the callings of the barber and surgeon were associated and practised by the same individual person. No one could dispute the eminent advantages that have resulted from their disjunction. But this has been succeeded by the separation of* medical *from* surgical *practice; a division, there is reason to apprehend, of hurt instead of benefit to society. I say their* practice *has become separate; for human ingenuity has not yet succeeded in distinguishing any boundary lines: I might say, any difference whatever in the* science *of the one and the other.*"—From a letter published as an Editorial in *The Veterinarian*, 1831, 4, 693.

IN PARLIAMENT

Minister on Livestock Expansion Policy

Mr. R. S. Hudson, when explaining to the House of Commons on December 5th the procedure to be adopted in fixing agricultural prices for the period of the four-year plan, said that some change in the character of our agricultural output might be necessary during the transition to peace. Broadly, this would mean a gradual expansion of livestock and livestock products, and a reduction from the high war-time levels of certain crops for direct human consumption.

To encourage a substantial increase in milk production and a revival in the rearing of cattle and sheep for meat production, an assured market and guaranteed minimum prices were being provided for milk, fat cattle, sheep and lambs, and calves until the summer of 1948. Actual prices would be considered at each February review, and subsequently fixed by the Government.

The Government intended to encourage also an expansion in pig, poultry and egg production to the fullest extent permitted by the supplies of feeding-stuffs which could be made available. A market would be assured throughout the four years for all fat pigs and eggs offered for sale. Again, prices would be considered each February and subsequently fixed by the Government.

Questions

Cattle (Tuberculin Tests)

Mr. W. J. Brown asked the Minister of Agriculture if he is aware that, in the considered view of the Agricultural Research Council and the National Veterinary Medical Association, the tuberculin testing of cattle is far from reliable; if he will take steps to speed up research into the production of an adequately standardised tuberculin; and will he take steps to amend the law which permits the sale in open market of cattle reacting to the tuberculin test, thus contributing to the spread of the disease rather than to its eradication.

Mr. Hudson: I think the point my hon. Friend has in mind is that no tuberculin yet produced is a wholly reliable specific diagnostic agent for bovine tuberculosis. The comparative test now employed, however, in which both mammalian and avian tuberculins are used, provides the most reliable means so far discovered of distinguishing reactions due to bovine tuberculosis from those due to other causes. Intensive research on tuberculin problems is continuing. With regard to the last part of the question, control on the lines suggested would, I am afraid, not at present serve any useful purpose in view of the much larger number of untested cows which, if tested, would react.

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Bovine Tuberculosis

Mr. Leach asked the Minister of Health what proof he possesses that the form of tuberculosis called bovine has ever been caused by drinking milk.

Mr. Willink: I am advised that human infection by the particular type of tubercle bacillus found in bovines can ordinarily be accounted for only by contact with this organism through eating meat or consuming milk or its derivatives. As the cooking of meat destroys the bacillus it must be concluded that tuberculosis of bovine origin is mainly attributable to milk. This is supported by the results of medical research showing incidence of bovine tuberculosis among persons drinking raw milk, but almost complete immunity from it among those drinking only pasteurised milk.

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Vehicles (Disinfection)

Mr. Turton asked the Minister of Agriculture whether the disinfection of a vehicle after it has carried imported meat prior to its carrying livestock or feeding-stuffs is obligatory; if so, under what authoritty these powers to enforce disinfection are exercised; and whether due publicity has been given to these obligations.

Mr. Hudson: The answer to the first part of the Question is "No, Sir", and I am sorry if any statement made during the Debate on the Adjournment on November 17th, gave a misleading impression. The relative Order made under the Diseases of Animals Acts requires vehicles carrying livestock to be disinfected after each load of animals has been discharged. I understand that Ministry of Health Regulations require all vehicles used for the conveyance of meat to be kept in a clean and hygienic condition.

Mr. Turton: Now that the mistake has been admitted, will my right hon. Friend consider the argument that I used at the time, that it is even more important to disinfect a vehicle carrying imported meat than livestock, and will he bring in regulations to deal with it at once?

Mr. Hudson: The matter is not one within my sole jurisdiction. The question is under examination but I cannot give any sort of promise of what action will eventually be taken.

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Milk Supply, London (Goats)

Commander Locker-Lampson asked the Minister of Agriculture (1) whether he will consider establishing within ten miles of London 10,000 goats, in view of the fact that they could supplement the milk supply and relieve the milk shortage;

(2) How many goats are being kept within ten miles radius of London; and if he will consider putting goats upon the gardens, parks and open spaces which are now being used.

Mr. Hudson: I have no information as to the number of goats kept within ten miles radius of London. As to the remaining parts of the Question, I am afraid my hon. and gallant Friend's suggestions are impracticable.

Commander Locker-Lampson: Is my right hon. Friend aware that the goat has been the poor man's cow for generations, that its milk is non-tuberculous, and that it gives two gallons per day? Why should we not march upon milk, to victory through vitamins?

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Salt (Contamination)

Brigadier-General Clifton-Brown asked the Minister of Agriculture whether he is aware that merchants are selling salt for agricultural purposes which has been used for preserving imported hides on board ships from the Argentine; and whether, in view of the fact that many of these hides are infected with foot-and-mouth disease, he will take steps to have this salt thrown away at the ports and not used on the land.

Mr. Hudson: There is no reason to suspect that outbreaks of foot-and-mouth disease in this country have been caused by the use for agricultural purposes of salt previously used for preserving imported hides. In the circumstances, I do not think there is any necessity to take action on the lines suggested.

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Food Supplies (Pigs, Slaughter)

Lieut.-Colonel Heneage asked the Minister of Food if his attention has been called to the procedure prior to the slaughter of injured or diseased pigs whereby authority is required from a veterinary officer and food office; and is he aware that the delay caused by this double certificate is a cause of suffering and loss of food; and what steps he is taking to prevent this.

Mr. Mabane: The owner of a pig, the slaughter of which is immediately necessary or desirable on account of either accidental injury or disease, may have it slaughtered without any prior certification.

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Hill Sheep Farming

Mr. Snadden asked the Secretary of State for Scotland how far arrangements have been made to implement the major recommendations of the committee on the reorganisation of the hill sheep industry.

Mr. T. Johnston: I am glad to be able to say that recent discussions with the various interests concerned have shown a large measure of agreement with the major recommendations of the Committee's Report, particularly with those bearing on the rehabilitation of hill sheep farms, and I am in consultation with my right hon. Friend the Minister of Agriculture and Fisheries, as to action which might usefully be taken. I may also refer the hon. Member to the reply I have given to-day to a Question on the issue of wool marketing. [In this reply Mr. Johnston announced the setting up of a committee to consider the organisation of wool marketing.]

Major McCallum: Is the Secretary of State aware of the great anxiety and worry that is caused to hill sheep farmers throughout Scotland and would-be tenants of hill sheep farms, owing to the uncertainty of action or no action on this Report?

Mr. Johnston: There is no justification whatever for any anxiety as to non-action in the matter. We set up the Committee; we have done everything we can to stimulate agreement by the various interests in the matter, and I can assure the hon. and gallant Member that action will be taken.

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Scientific Publications (Public Grants)

Sir E. Graham-Little asked the Chancellor of the Exchequer what is the present amount of the financial aid given to the Royal Society and other bodies to assist scientific publications; and whether he is yet in a position to announce whether it will be possible to increase this amount in the near future.

Sir J. Anderson: The grants in aid to the Royal Society and to the Royal Society of Edinburgh include provision of £2,700 and £300 respectively, allocated specifically to scientific publications. Scientific publications are also issued by other bodies receiving grants from public funds, notably the Medical Research Council and the Agricultural Research Council, but except as mentioned above the grants are not allocated to specific purposes. The possibilities of publication in war-time are restricted by a number of factors, and I am not aware that the amount of the grant from the Exchequer has operated to reduce their number. I am not yet in a position to state the amount of the grants which Parliament will be asked to provide in 1945 for scientific investigation and research.

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Poultry Feeding-Stuffs

Sir J. Mellor asked the Minister of Food why the quality of balancer meal for domestic poultry has deteriorated; whether he is aware of the effect upon the health of the birds and their egg production; and what steps he is taking to improve the meal.

Colonel Llewellin: There has been no deterioration in the quality of National Poultry Balancer Meal. The second and third parts of the Question do not, therefore, arise.

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Rabbits (Steel Traps)

Mr. Arthur Duckworth asked the Minister of Agriculture whether a decision has now been reached to cancel the Order made under Defence Regulation 63, which permits the use of steel traps in the open contrary to the provisions of the Prevention of Damage by Rabbits Act, 1939.

Mr. Hudson: No, Sir.

Mr. Duckworth: Is there any justification for continuing this barbarous practice, in defence of a decision come to by the House before the war?

Mr. Price: In maintaining the use of these traps, where necessary, will the Minister see that they are not used in such a way as to catch domestic animals?

Mr. Hudson: I have already stated, in answer to previous questions, that the whole matter is under reconsideration at the present moment.

R.C.V.S. MEMBERSHIP EXAMINATIONS

List of Successful Candidates

London

First Year:

Archard, M. V.
Bowler, G. T.
Caspari, E. L.
Cousens, A. D.
David, H. W.
Harwood, P. M. A.
Hicks, J. B.
Holt, J. R.
Howorth, John
Hughes, E. J.
Hurst, P. E.
James, Miss V. M.
Jones, W. A.
MacMichael, Miss E. M. H.
Mulcair, T. B. (B)
Nicol, J.
Ogden, A. L. (B)
Price, E. K.
Pinniger, R. S.
Tarry, A. R.
Toombs, J. H. F.
Young, S.

(B) denotes credit in Biology.

Second Year:

Benham, Miss C. (H)
Brook, A. B.
Cradock, G. J. G.
Curwen, Miss P.
Diffey, S. J. K.
Greenough, P. R.
*Griffiths, E. C.
†Lloyd-Griffiths, F.
Redfearn, M. S. (H)
Warren, W.

† denotes 1st Class Honours.
* denotes 2nd Class Honours.
(H) denotes credit in Histology, etc.

Third Year:

Birkbeck, Miss M. C. (A) (H)
Breeze, Miss L. A.
Bonnaud, Miss Z.
Brown, R. H. (H)
Carr, R. J. (A) (H)
Deans, D. H.
Duncan, E. S.
Hammond, F. C.
Lloyd, J. R. (A) (H)
Miller, E. R. (A)
Richards, Miss B.
Shields, Miss P.
Smith, Miss A. G. (P) (H)
Stafford, L. P.
Thomsett, L. R.
Wells, E. A. (P) (A)

(P) denotes credit in Pharmacology.
(A) denotes credit in Anatomy.
(H) denotes credit in Hygiene.

Fourth Year:

Archer, R. K.
Bowen, D. I.
Chapman, R. J.
Davies, Peter
Dingle, P. J.
Heslop, G. P. M.
*Lawn, A. M.
Macqueen, J. M.
Pettifer, J.
Rogers, M. J. H.
Salmon, W. M.
Ussher, Miss G. C.
Warde, J. D.
Wood, D. R.

* denotes 2nd Class Honours.

Final Year:

Bateman, H. N.
Burke, N. F. S.
Das, M. S.
George, I. G.
Harvey, D.
Holford, G.
Jukes, A. W.
Moore, T. D.
Underwood, D. B.
Wilson, F. A.

(*To be continued.*)

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Dec. 18th.—Meeting of West of Scotland Division, N.V.M.A., at Glasgow (George Hotel), 2.45 p.m.

Dec. 20th.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, 1, Wimpole Street, W.1, 2 for 2.15 p.m.

Dec. 30th.—Whole-day Conference of the Nutrition Society, at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 11 a.m.

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PERSONAL

Illness of Colonel Brittlebank.—Our readers will learn with deep regret that Lt.-Colonel J. W. Brittlebank, Past President of the Royal College of Veterinary Surgeons and President of the Victoria Veterinary Benevolent Fund, is lying very seriously ill at his home, Wimborne House, Sawbridgeworth, Herts. His condition gives rise to grave anxiety.

. . . . . .

Births.—Campbell.—On December 1st, at Burton Nursing Institution, to Isobel (*née* Graham), wife of David Campbell, M.R.C.V.S., of Burton-on-Trent—a daughter (Morag Scott).

McLintock.—On December 4th, at Grove House Nursing Home, Norwich, to Pauline, wife of John McLintock, M.R.C.V.S., of Pentire, Dartford—a son.

Nisbet.—On December 4th, 1944, at Easterbank House, Forfar, to Rena, wife of James Nisbet, M.R.C.V.S.—a son. Both well.

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Appointment.—Professor J. M. Mackintosh, M.A., M.D., F.R.C.P., has been appointed Dean of the London School of Hygiene and Tropical Medicine from January 1st next.

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Presentation to Mr. A. M. K. McLeod, M.R.C.V.S., D.V.S.M.—As Mr. McLeod, Divisional Inspector, is being transferred from Renfrewshire and Buteshire Division to the Head Office of the Ministry of Agriculture and Fisheries, London, a deputation, representing the farming community and the veterinary profession, called on him at Paisley on December 4th.

Mr. John Whiteford expressed appreciation of the energetic and helpful manner in which, during the last 12 years, Mr. McLeod had succeeded in getting owners to establish tuberculin-tested and attested herds. As a token of esteem from numerous subscribers from all classes of stock-owners, he presented to Mr. McLeod a wallet of notes and conveyed to him the best wishes of all for further success.

In returning thanks, Mr. McLeod commented on the happy relationships which had been maintained, even in difficult days, during his time amongst them.

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The Late Mr. Richard Hudson, F.R.C.V.S

The personal tribute to Mr. Richard Hudson, of Retford, published in our issue of December 2nd, shortly after his lamented death, not only faithfully reflected the man as his friends knew and loved him, but etched his background and early days and his later career as a practitioner who made a great name as a surgeon. A few further biographical details and comments may be added.

Born in 1876, Richard Hudson was educated at the East Retford Grammar School and at St. Augustine's School, Dewsbury. In the family tradition, he followed his father and grandfather at Camden Town in 1897. Ever a keen student of "the art and science," he sought veterinary knowledge wherever it was to be found, and while the written word had its essential place, for him the real domain of enquiry and instruction was "the field." Although keenly interested in all branches of veterinary work, his real love was for surgery, and he performed, notably, cryptorchid and roaring operations for members of the profession over much of the Midlands. A born craftsman, he would spend hours in his workshop, and the results of his labours in designing and making for his own use and that of his fellow practitioners a number of special instruments proved, and remain, a boon to many, more particularly to those engaged in cattle practice.

Mr. Hudson was one of the first people in Retford to own a car; also a motor-cycle. He preferred using the latter except when he had a lot of "tackle" to take with him. His work was his main hobby, but his interests were varied and he loved Roman remains, cathedrals and other historic buildings, paintings and many other of the finer things of life appealing to the man of culture.

Unfortunately, owing to the difficulties of transport, the son, Mr. J. Richard Hudson, D.D.V.S., Kabete, was unable to reach England from Kenya before his father passed away. At the funeral service held at West Retford Church, the large company included Major T. Hicks, Sleaford, representing the N.V.M.A. and the Lincolnshire Veterinary Medical Association; Mr. B. Sampson, representing the North Midland Veterinary Medical Association; Mr. and Mrs. T. Bowett, Worksop, Mr. S. E. Sampson, Mr. S. Sampson and Mr. J. F. Talbot.

A Further Personal Tribute

The character of Richard Hudson has been so ably depicted by J. McC. in your issue of December 2nd, that further comment almost seems superfluous. The writer would, however, like to add a brief personal appreciation.

I first came to know Hudson at the Bath Congress and since that time I have counted him as a great friend. I soon came to know of his high qualities of kindness, modesty and ability.

As a general practitioner he was outstanding: as a surgeon he was supreme. What is more, his knowledge and advice were freely available to all.

If an instrument of his own making was particularly admired in due course a parcel would arrive with Richard Hudson's compliments.

The gap he has left will be hard to fill but the memory and inspiration will remain.

O. V. G.

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THE REGISTER OF VETERINARY SURGEONS

The present addresses of the following members are not known to the Registrar of the College. The list gives the last known address:—

Adams, James Earle, 126, Fore Street, Kingsbridge, South Devon; Brown, J. J., Chorley, Lancs.; Cannon, G. T., Jeffreys Bay, Cape Province; Carey, P. D., Les Profonds Camps, St. Martins, Guernsey; Custance, Harry, Rowley Fields, Leicester; Devlin, William Andrew, Dunvegan Yds., Edmonton, Alberta, Canada; Finucane, Edward, Bellville, Castleknock, Co. Dublin; Fox, Henry P., London; French, James Anthony, Port Chaplain, R.N. and M.N., Postnergate, Hull; Grist, A. G., Belvelor, Everton Road, Gillith, Natal, South Africa; Herbert, Louis, Enniskillen, Co. Fermanagh, N. Ireland; Hewson, Fred, Lower Farm, Throcking, Buntingford, Herts.; Jarratt, Wm. Farrow, The Gables, Rusthall, Wilts.; Jones, Arthur Humphreys, 12, Imperial Road, Exmouth, Devon; Kerr, Finlay, 40, Fourth Avenue, Bangor, Co. Down; Kilpatrick, Wm. A., Big Muddy, Saskatchewan, Canada; Knight, Rupert Wm. J., The Kennels, Gt. Packington, Coventry; Lalor, A. D., North Lodge, Sleaford, Lincs.; Leonard, Harry Sidney, 93, Condamine Street, Manly, Sydney, N.S.W.; McDougall, Kenneth Dougal, California; McPhee, Donald Archibald, 21, High Skellgate, Ripon, Yorks.; Maxwell, Harrie Malcolm, c/o India Office, London, S.W.1; Murison, Robert Edward, Norfolk Street, Boston, Lincs.; O'Brien, Francis Noel, 9, Prince of Wales Road, Poona, India; Rice, John Patrick, Veterinary Inspector, Parliament Buildings, Stormont, Belfast, N.I.; Rocker, George, Australia; Rolbag, Eliezer Dan, P.O. Box 123, Haifa, Palestine; Shedlock, Kathleen Webb (Miss), Hafod, Hawarden, Chester; Short, Percy G., Ipoh, Perak, Federated Malay States; Sproston, Henry, 3464, 36th Avenue West, Vancouver; Tabuteau-Herrick, Henry G., Rock Lodge, Fleet, Hants.; White, Munro Erskine, The Laurels, Petersfield, Hants.

These names will be removed from the Register under the provisions of section 5 (4) of the Veterinary Surgeons Act, unless information is received by the Registrar with a correct address in time for inclusion in the 1945 edition of the Register. The usual statutory notices have been issued.

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B.M.A. AND THE HEALTH SERVICE PROPOSALS

"From an impressive mass of negative resolutions it emerges only that the conference has willed almost all the ends and rejected almost all the means"—thus comments *The Times* on the findings of the annual representative meeting of the British Medical Association on the White Paper proposals for the establishment of a National Health Service. Nevertheless, with a strong emphasis on safeguards, especially as regards professional freedom and in the interests of the patient, the outcome of the four days' discussion was a decision to resume negotiations with the Minister of Health early in the New Year.

A summing up by Dr. Guy Dain (Birmingham), Chairman of the Council, defined the field of controversy between the B.M.A. and the White Paper proposals and stated that the meeting—

Was in favour of the development of the health services;

Disapproved of the White Paper as it stands;

Decided to negotiate, and appointed its share of the Negotiating Committee;

Preferred to proceed by evolution of national health insurance, putting first the problem of the voluntary hospital system, and then the extension of the general practitioner service of national health insurance;

Most emphatically did not wish to be employed by the local authorities;

Declared that there should be no civil direction, no whole-time salaried service, and no clinical control.

The following illustrates typically the spirit of the gathering in relation to the preservation of professional independence and freedom from threatened bureaucratic domination: A Glasgow proposal expressing willingness to continue a panel service declared that the meeting was wholly opposed to a whole-time State salaried service for general practitioners, to civil direction of practitioners, to government of the profession by local health authorities—in short, to most of the machinery of the White Paper and to any and every measure which tended in any respect to limit the freedom of judgment and action of the practitioner, or to weaken his responsibility for his patient. These clauses were voted on separately and carried unopposed or by very large majorities.

Two resolutions carried unanimously early in the meeting defined the general attitude in offering a warm welcome to the Government's declared intention "to ensure that in future every man and woman and child can rely on getting all the advice and treatment and care which they may need in matters of general health"; and that "it is essential that the proposed National Health Service should be the best that can be established." This was supplemented by an expression of grave disquiet at the proposals to place the administration of the service under the Ministry of Health and the local authorities and a demand for a thorough and impartial enquiry into the proposed administrative structure. This qualification was the burden of many subsequent speeches and motions.

Regional Councils

There seemed to be little faith in the Ministry of Health and a profound distrust of local authorities. Both Whitehall and the Town Hall came in for undiluted criticism. But the meeting dropped the idea of a corporate body as the central administrative machine, and in place of the joint boards recommended the formation of regional counsils as local administrative units.

On these regional councils "should be representatives of local authorities, the medical profession, including general practitioners and the medical staffs of voluntary and municipal hospitals, other vocational interests, and the management committees of the voluntary hospitals."

At its concluding session the Association "expressed its objection to far-reaching changes of a controversial character . . . unless they are proved indispensable to the war," but agreed to begin negotiations with the Minister of Health without waiting for all Service doctors to be demobilised, lest the Government should accuse the Association of refusing to collaborate in preparing a national medical service. A comprehensive medical service should be available to all who need it, "but it is unnecessary for the State to provide it for those who are willing and able to provide it for themselves." The negotiators are instructed to tell Mr. Willink further that the B.M.A. will agree to "100 per cent." as soon as it is satisfied on "the machinery whereby private practice is to be continued" and on "the general professional and administrative arrangements" of the service. They will assert their conviction that doctors working for private fees can offer patients better service than doctors working under contract for the community.

Without discussion the meeting "welcomed wholeheartedly" the social security scheme of the White Paper. On the separation of social security from national health Dr. Staveley Gough (Watford)

said that it was time they told the politicians to come down to earth and that it must take years for a national health service to be evolved.

Most of the rest of the agenda proved non-controversial, including a unanimous declaration that any complete health service for the nation should include control of patent medicines: Dr. P. Phillips (Bristol), in moving a resolution that "the education of the public on the meretricious claims of patent foods, drinks, medicines, etc., should be intensified immediately," said that 20 millions a year were spent on "various nostrums."

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THE MEDICAL CURRICULUM

Sir Herbert Eason, in his presidential address to the General Medical Council, announced that since the last meeting the Inter-Departmental Committee on Medical Schools (the Goodenough Committee) had issued its report. The Minister of Health had requested an early opinion from the Council on the subject of curriculum revision. The Council had, therefore, decided to take the initiative forthwith on recommendations in regard to registration of students, and resolutions in regard to professional education and examinations. Four committees had been appointed to consider the curriculum.

[Sir Herbert Eason has been elected President of the General Medical Council for the term ending on November 30th, 1947.]

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THOROUGHBRED BREEDERS' ASSOCIATION

Lord Rosebery, speaking at the annual meeting at Newmarket of the Thoroughbred Breeders' Association, of which he is President, made a plea for greater facilities for horse-racing, which he described as the shop window by which breeders of thoroughbreds could prove the goodness or otherwise of their wares, for the racecourse was the acid test by which our horses were appraised.

"We read in every paper and in most political speeches," continued Lord Rosebery, "that the one thing this country must do if we wish to maintain our pre-eminence is to increase our export trade. Well, here we have on our hands a commodity that is desired all over the world and which can be obtained nowhere else in such excellence as it can be in these islands. The British thoroughbred stands alone. At the present time there is a demand for it all over the world—India, Australia and New Zealand, South America and North America are all wanting our thoroughbreds. They want to buy the best, and therefore they must come here; but I would like to give this warning, that if they cannot buy the best they will go elsewhere for the second-best because they are short of bloodstock. That is why I should like to secure the help and backing of the Chancellor of the Exchequer. Before the war we exported on an average more than 1,000 animals a year. From enquiries coming in it is evident that the demand is greater now than it ever has been, but, as I have warned you, if we are closed down much longer in the manner that we are at the present time the future outlook will be bad."

. . . . . .

The main interest in the Newmarket sales on the day of the above meeting was centred in the sale of Lady Bullough's two-year-old filly Carpatica, by Hyperion out of Campanula, who won the One Thousand Guineas in 1934. The bidding for her was fast and furious. It opened at 6,000 guineas and in a very short time the filly had been knocked down to Mrs. Nagle for the huge price of 15,000 guineas, a record price for a two-year-old at public auction.

One transaction at the sales represented a remarkable piece of good fortune for Major E. C. Doyle, D.S.O., the Epsom veterinary surgeon, a former well-known amateur rider. At a Dublin sale six years ago he gave 20 guineas for an unpromising foal out of Clarence, dam of Sun Chariot. That foal became Sister Clara and was now sold for 11,000 guineas to Miss Dorothy Paget. Sister Clara's first foal was sold as a yearling in September for 6,600 guineas. Major Doyle's gross profit, therefore, is 17,580 guineas.

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CLEANER MILK

But Deleterious Effect of Water Shortage on Farms

The latest official figures of testings carried out under the Ministry of Agriculture's testing and advisory scheme show that in the three months ending June only 0·13 per cent. was rejected as unfit for use. For the same period last year the figure was 0·14 per cent. The amount of unsatisfactory milk during June last was 81,000 gallons out of a total production of 82½ million gallons. Most of the trouble, the tests showed, was caused by unsterilised utensils, and unsatisfactory cooling.

It is understood that figures for the next three months will not show such satisfactory results owing to the lack of water on many farms, caused through the drought of last summer.

Other results were: Category C routine tests (unsatisfactory) 1943—11·2 per cent.; 1944—8·7 per cent. Churn tests (unsatisfactory), machine washed 31 to 27 per cent.; hand washed, 54 to 35 per cent.

The churn test, it should be stated, is of an extremely high standard.

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Erratum.—In the report of the special meeting of Council, N.V.M.A. (*V.R. Suppl.* 5. 146, col 1), in the penultimate paragraph, Major H. Kirk's reference to acceptance of almost the entire report of the Loveday Committee "with the definite exception of paragraph 20, page 13," should read ". . . paragraphs 15 and 20, page 13."

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SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

Statement showing the Number of Undertakings notified to the Ministry of Agriculture during the Month ended Novemebr 30th, 1944

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle: Cows	Number of Cattle: Heifers
ENGLAND					
Bedford	—	43	43	991	538
Berks	—	105	105	3,553	2,208
Bucks	1	95	96	3,184	1,766
Cambridge	—	14	14	344	208
Chester	—	411	411	13,454	4,594
Cornwall	—	4	4	72	75
Cumberland	—	65	65	1,618	1,411
Derby	5	332	337	9,616	5,468
Devon	1	283	284	4,264	2,548
Dorset	—	70	70	2,160	1,145
Durham	2	284	286	6,294	2,147
Essex	—	257	257	9,172	5,351
Gloucester	—	102	102	3,004	1,765
Hampshire	3	400	403	11,133	7,443
Hereford	—	24	24	339	221
Hertford	—	78	78	2,344	1,444
Hunts	—	13	13	475	302
Isle of Ely	—	3	3	83	75
Isle of Wight	—	14	14	252	127
Kent	3	156	159	4,015	2,309
Lancs	3	202	205	5,793	1,806
Leics	2	100	102	2,612	1,814
Lincs (Holland)	—	3	3	25	11
Lincs (Kesteven)	—	25	25	334	142
Lincs (Lindsey)	1	105	106	2,036	1,166
Middlesex	—	16	16	641	307
Norfolk	1	194	195	5,898	4,057
Northants	—	86	86	2,402	1,836
Northumberland	—	68	68	2,329	1,112
Notts	1	164	165	3,663	2,204
Oxford	—	43	43	1,269	1,144
Rutland	—	8	8	138	91
Salop	—	278	278	8,472	4,056
Soke of Peterborough	—	1	1	37	31
Somerset	3	242	245	6,298	2,944
Staffs	1	218	219	6,403	3,431
Suffolk, E.	1	99	100	2,308	1,691
Suffolk, W.	—	51	51	1,054	631
Surrey	1	109	110	3,128	1,448
Sussex, E.	3	175	178	4,528	2,566
Sussex, W.	—	120	120	3,307	1,981
Warwick	1	139	140	3,454	2,130
Westmorland	—	14	14	414	506
Wilts	1	95	96	3,905	1,835
Worcester	1	157	158	3,294	1,515
Yorks, E.R.	1	106	107	1,666	962
Yorks, N.R.	—	117	117	2,351	1,442
Yorks, W.R.	—	270	270	6,553	2,542
WALES					
Anglesey	—	48	48	836	611
Brecon	—	9	9	199	108
Caernarvon	3	111	114	1,785	977
Cardigan	2	30	32	583	394
Carmarthen	4	238	242	4,316	2,209
Denbigh	—	61	61	1,360	653
Flint	2	116	118	2,603	1,150
Glamorgan	—	104	104	1,737	677
Merioneth	—	10	10	125	68
Monmouth	—	55	55	1,325	775
Montgomery	—	15	15	296	222
Pembroke	1	84	85	1,647	1,175
Radnor	—	—	—	—	—
TOTALS	48	6,839	6,887	177,491	95,565

Notes.—(1) Operative periods of undertakings: 1 year, 1,392; 2 years, 612; 3 years, 4,983. (2) Undertakings renewed for a further period: 1 year, 752; 2 years, 145; 3 years, 134. (3) Undertakings not renewed at end of operative period, 485. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for a further period.

Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	1	18	19	722	193
Angus	—	19	19	632	335
Argyll	—	6	6	113	115
Ayr	—	38	38	1,238	928
Banff	—	3	3	119	42
Berwick	—	2	2	53	22
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan ..	—	7	7	279	246
Dumfries	—	14	14	744	613
Dumbarton	—	3	3	105	86
East Lothian ..	—	3	3	145	88
Fife	2	32	34	1,243	493
Inverness	—	9	9	346	191
Kincardine	—	5	5	231	126
Kinross	—	3	3	50	32
Kirkcudbright ..	—	11	11	585	379
Lanark	1	20	21	722	526
Midlothian	—	1	1	44	69
Moray	—	—	—	—	—
Nairn	—	1	1	14	—
Orkney	—	—	—	—	—
Peebles	—	4	4	54	21
Perth	—	32	32	720	427
Renfrew	—	8	8	345	262
Ross-shire	—	3	3	80	65
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	28	28	841	670
Sutherland	—	4	4	76	66
West Lothian ..	—	1	1	23	18
Wigtown	1	18	19	1,138	600
Zetland	—	—	—	—	—
TOTALS ..	5	293	298	10,680	6,613

Notes.—(1) Duration of undertakings: 1 year, 28; 2 years, 26; 3 years, 244. (2) Undertakings renewed for a further period (included in column 2 of statement): 1 year, 34; 2 years, 5; 3 years, 5. (3) Undertakings expired and not renewed (not included in column 2 of statement): 85. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings.

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CONTROL OF CONTAGIOUS ABORTION

"I am certain that the announcement by the Ministry of Agriculture that supplies of vaccine for calf vaccination are now available will be welcomed by those interested in the control of contagious abortion," writes a contributor in the current issue of *The Farmer and Stock-Breeder*, and continues: "But it would have cleared up a debatable point if the Ministry had stated which vaccine they recommend for the immunising of cows and heifers of the breeding age. Perhaps that will follow later. It is to be hoped that farmers will take advantage of this offer to vaccinate their calves. This, in my view, is the greatest step forward yet taken for the control and gradual elimination of this formidable menace to the dairying industry."

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NATIONAL HORSE ASSOCIATION

With the election of over 200 candidates at its last meeting of Council, the membership of the National Horse Association now stands at 1,404. During the war years membership dropped from 1,560 in 1938 to as low as 1,123 paid up members in 1942, so the Council was very gratified to see the rapid recovery of this loss.

Lt.-Col. M. Ansell, D.S.O., and Mr. J. C. Hayes, of the Gloucester County Horse Association, were elected to fill vacancies on the Council and the resignations of Sir Cuthbert Quilter, BART. (representing the Suffolk Horse Society), Mr. W. Perryman, M.R.C.V.S. (representing the Central Veterinary Society), and Mr. C. F. Ellis (representing the Federation of Master Saddlers) were received with regret. These three societies were asked to nominate new Councilmen to fill these vacancies.

In response to a recent appeal for the Parcels for Prisoners of War Fund, the sum of £260 has been collected.

County Horse Owners' Associations.—The Council gave full approval to the suggested formation of County Horse Owners' Associations, as it felt that much local assistance could be given to the National Horse Association in many of its activities—bridle ways, riding tours, tracks, etc. It considered, however, that it was desirable that they should all be formed on identical lines, with, if possible, the same rules, objects, etc. The Council appointed a small sub-committee to draw up suggested rules and to make suggestions on how to form such an organisation.

Grass Sickness.—Members present expressed concern at the prevalence of grass sickness and the serious effects it was having on horse-breeding in the North. Many horses were lost each year, and it was resolved to ask the Ministry of Agriculture what advance had been made in investigating this disease since the last report issued of the Moredun Institute, and whether the Ministry's Veterinary Department could not also investigate this serious matter.

Grease.—The prevalence of grease among farm horses and heavy transport horses also came up for review, and it was decided to write to the Ministry of Agriculture directing attention to the fact that investigations might well be made.

Other subjects that came up for discussion were slippery roads, the shortage of stallion leaders, the introduction of racing at gymkhanas, and the start of trotting races in Ireland.

Leaflets.—The Council noted that 18,500 copies of the six leaflets of the Driving Club had been issued, 22,500 of those dealing with commercial transport, and 26,500 of the remaining nine on various subjects. As soon as paper became available it was resolved to reissue the more popular leaflets and to prepare fresh ones for circulation to members.

It was reported that though many members had requested that the Association's popular "Horse Owners' News-Sheet" should be enlarged and improved upon, this was not possible at the moment owing to the paper restrictions.

* * * * *

"RUSSIA'S GIANT CATTLE TREK"

Writing in a recent issue of his paper, under the above heading, Arthur Inkpin, *Daily Telegraph* Moscow Correspondent, reports that what the Russians describe as the biggest and longest cattle drive in history has been successfully carried out this summer and autumn in the Soviet Union. "The last stragglers of more than a million head of cattle, sheep and goats are now being delivered to their destinations in the liberated territory after a trek of 1,000 miles and more from other parts of the country.

"This livestock has been purchased in the east under Government auspices to restock collective and State farms of the Ukraine and Belorussia, and the provinces of Smolensk, Orel, Bryansk, Kursk and Leningrad, which were picked almost clean by the Germans during the occupation.

"The drive began in such distant parts of the Soviet Union as Kazakhstan, on the other side of the Caspian Sea, as early as May 15th. According to the latest reports about 900 000 head have already been turned over to their new owners. The remaining 100,000 odd were expected to be delivered before the country's recent celebration of the 27th anniversary of the revolution.

"By the decision of the Government 25,000 men and women were mobilised for this greatest cattle drive of all time. In addition to the professional drovers in command, an army of butchers and slaughterhouse men, dairymaids and ordinary herdsmen and shepherds took the road after a short course of specialised training. It was clearly impracticable to ship the animals by rail. Transport officials quickly estimated that such a 'consignment' would require at least 60,000 trucks and 1,000 engines for a period of three to four weeks.

Preparations for the drive were as thorough and detailed as those made by the Red Army Command for any new offensive. A special staff headquarters was set up in Moscow, where a giant large-scale map of the U.S.S.R. from the Ukraine and Belorussia to Central Asia was gradually covered with lines, squares and circles in different coloured pencils as reports were received from hundreds of scouts reconnoitring the countryside. These pencilled marks on the map showed the location of wells, springs, meadows and pastureland.

"The work of blazing the trail for the cattle drive went on for many months. The scouts covered thousands of miles from the east westward and fro the north-east south-westward. Advancing by stages of ten miles, they selected the most suitable sites for grazing, watering and bedding down the cattle. Finally 23 routes were plotted of a total length of 25,000 miles.

"Then 540 veterinary stations were established along the routes to examine and treat the cattle on the road.

"The painstaking care with which the drive was planned and carried out had its reward. According to reports the bulk of the cattle put on weight while en route. Many hundreds of calves and lambs were born during the trek; they had not figured in the delivery notes, but they appeared in the receipts which were collected at the end of the drive by the trail captains."

* * * * *

MINISTRY OF AGRICULTURE NEWS SERVICE

Improvement through the Farmer.—What is the main factor for the improvement of our dairy stock? Such a question is usually met by an answer that revolves round the word "bull." Improvement, however, in any branch of farming cannot take place unless the farmer himself is willing and at the same time has sufficient knowledge to put new schemes and ideas into practice. It is, therefore, the farmer himself who constitutes the main factor.

Professor H. D. Kay, Director of the National Institute of Dairying, Reading, said recently, "It is part of our duty to make sure that those who succeed to our farms know more of modern agriculture than we ourselves know." That there is a big movement

in this direction is shown by the growth and the good work that is being done by the Young Farmers' Clubs and by demonstrations of all kinds organised by County War Agricultural Executive Committees. It is a hopeful sign of the times that club memberships are growing and that so many farmers and their farm workers are attending the demonstrations, even when they are held in the evening after a hard day's work.

Starting the Milk Flow.—Why does a cow hold up her milk? The answer is that she does not do so deliberately. The letting down of milk by a cow is not a voluntary action on her part; it is automatic and is the result of a secretion of a hormone known as oxytocin produced by the pituitary gland.

Before a cow can yield milk something must happen to excite this gland and cause a milk flow. A cow must associate ideas whether they occur to her through the medium of her sense of sight, hearing, smell or touch. A sense of contentment will predispose her to let her milk down because of the effect of her frame of mind upon the pituitary gland. Anything that links up with unpleasantness tends to a secretion of adrenaline from the adrenal glands which more or less neutralises the action of the oxytocin.

It takes about 40 to 50 seconds for the pituitary secretion to commence, that is why stimulation in the form of udder-washing and massage should be given just before milking. If milking is subsequently delayed as much as ten to 20 minutes, the oxytocin will have largely dissipated into the blood so serving to prevent an appreciable amount of milk and butter fat from reaching the milk pail.

Good Pasture lessens Worm Trouble.—It might be supposed that the increased stock-carrying capacity of an improved pasture would lead to a corresponding increase in the danger from infestation with parasitic worms. This, however, is not necessarily the case.

Dr. Gwendolen Rees, Aberystwyth, is investigating the correlation between poor and good hill pastures and worm infestation of stock, and it has been found that the nutritional value of good grass gives the animals a high resistance against worm trouble.

Two areas have been chosen for the purpose, one an improved hill pasture carrying four sheep to the acre, the other poor hill land with a grazing figure of 1·6 sheep to the acre. From May to the beginning of December of each year the sheep are kept on the two hill pastures. For the remaining five months, a time when sheep on pasture are particularly subject to nematode worm trouble, they are removed to a lowland pasture.

It has been found that the sheep that have access to this improved hill pasture in the summer, autumn and early winter show a marked lessening of worm infestations as compared with those who spend the period in question on the unimproved pasture.

Grazing Capacity of Cows.—Under good conditions and in perfect health, cows will consume about 150 lb. per head of greenstuff in eight hours' grazing. If, however, conditions are not good and the cows are not up to the mark this "input" can fall to 45 lb. per head in eight hours.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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NICOTINE AND COPPER SULPHATE FOR LAMBS

Sir,—Mr. Rees-Mogg's remarks in his letter to *The Veterinary Record* of September 2nd, 1944, in connection with an article by me on "Nicotine Poisoning in Lambs" published in the issue of July 29th, are noted with interest. It is difficult, however, to understand how he arrives at the quantities of copper sulphate and nicotine sulphate contained in each dose of the worm drench given by him. He states that he has given 3½ oz. to a ewe and 2 oz. to a lamb, of a solution made up by adding 4 oz. of copper sulphate and 4 oz. of a 40 per cent. solution of nicotine sulphate to three gallons of water. He calculates that the dose for a ewe contains 10½ grains each of copper sulphate and nicotine sulphate, while the dose for a lamb contains six grains of each. It has perhaps been overlooked that 4 oz. of the stock solution of nicotine sulphate, being a 40 per cent. solution of the salt, contains only 768 grains of nicotine sulphate and not 1,920 grains. If my calculations are correct 3½ oz. of the worm dose will contain 14 grains of copper sulphate and 5·6 grains of nicotine sulphate, while the dose of 2 oz. for lambs will contain eight grains of copper sulphate and 3·2 grains of nicotine sulphate.

If reference is made to my original article, it will be seen that 3·2 grains of nicotine sulphate (contained in 1 oz. of a solution made up in accordance with the prescription given in the Handbook for Farmers in South Africa), when given to lambs having an average weight of 37·2 lb., produced toxic symptoms such as Mr. Rees-Mogg sometimes observes.

Dr. Monnig (1939, *Farming in South Africa*, **14**, 107-114) recommends a dose which is the equivalent of 4·8 grains of nicotine sulphate for ewes, and 2·4 grains for lambs. Using Mr. Rees-Mogg's prescription, these quantities would be contained in 3 oz. and 1½ oz. of the solution respectively.

Yours faithfully,

Maun, Ngamiland, H. A. Crawshaw.
Bechuanaland Protectorate, S. Africa.
November 11th, 1944.

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RE "SIX-DAY CHICK DISEASE" LOSSES

Sir,—I think the following record of chick losses at a hatchery may be of interest as a further comment on the recent article by Temperton and Bythell.

Four firms supplied chick meals during the period. Different consignments from one firm caused variable chick losses. It was also noted that some consignments consisted of different mixtures as seen by the divergent results on the chicks. The consignments called A (1) and D appeared most normal and gave the best result.

Date of Hatching	Number of Chicks	Percentage Loss up to 3 Weeks	Percentage Loss up to 5 Weeks	Consignment of Meal
Jan. .. .. Feb. 2nd ..	420	—	8 to 10	A (1)
Feb. 22nd ..	482	30	45	B
„ 29th ..	438	22	31	
Mar. 15th ..	620	20	28	C
„ 28th ..	586	30	43	
Apr. 4th ..	515	28	37	A (2)
„ 18th ..	411	20	28	
„ 25th ..	671	12	18	A (2) followed by D at 4 days old
May 2nd ..	408	7	15	D
„ 9th ..	367	10	14	

Losses as deaths and because of culling of weak stunted chicks from five weeks when they left the brooder up to five months of age amounted to a further 37 per cent. in the hatches from February 22nd to April 18th.

At this time screening of the chick meal to remove coarse fibre (chiefly oat husks) and the addition of 10 per cent. boiled mashed potatoes, later raised to 25 per cent., was started. In subsequent hatches (April 25th to May 9th) added losses up to five months old only amounted to 9 per cent. Most losses occurred in five to ten days old chicks between 7 and 9 a.m. (also odd ones throughout the day) and very few occurred during the night. Bigger chicks eating most food were chiefly affected. As many as 200 chicks died in one day during the peak period.

Affected chicks had their crops distended with gas, especially at night time when they huddled together in the cooler parts of the hover.

Strong chicks improved with the food adjustments, but those already affected showed little response. The potato mixed with the screened mash was fed to chicks after five days old, dried meal being used previously. It seems to me there are some common findings to account for these chick losses, however variously they have been expressed. I support those of Messrs. Asplin, Dobson, Gordon and Blaxland. I think that almost any readily digested food (low in fibre content) added to many of the chick meals in the 1943 rearing season in amounts of about 25 per cent. would have stopped the enormous losses which occurred.

My *post-mortem* findings in many of these chick losses were in complete agreement with those of Dobson and his colleagues and included impaction with coarse fibre at all levels of the digestive tract from the crop downwards. I am pleased to note such losses had been less frequent this year and that other defects in chick meals were also reduced in amount.

In view of the above opinions I would like to suggest that "Crude Fibre Enteritis of Young Chicks" is more descriptive of the condition than "Six-day Chick Disease." Such chicks may show evidence suggestive of chill on *post-mortem* examination and probably due to the low intake of food.

Yours faithfully,

Seale-Hayne Agricultural College, C. V. Watkins.
Newton Abbot, Devon.
December 6th, 1944.

SIX-DAY CHICK DISEASE.

Sir,—The interesting communication by Messrs. Temperton and Bythell in your issue of October 28th and the letters from Mr. Mayall in that of November 11th, and from Mr. Asplin and his colleagues in that of November 25th, have prompted me to offer you some personal observations on this condition, for publication, with your kind permission, in the correspondence columns of *The Veterinary Record*.

As Mr. Asplin and his colleagues remark, this disease has not appeared only recently; the writer of this letter investigated an outbreak in a large poultry breeding farm in Cheshire as long ago as March, 1932. In that year and in succeeding years up to 1936, other outbreaks were investigated; since the beginning of the war, cases of the disease have been observed in small batches of Brown Leghorn chicks hatched in this institute. It might be mentioned here that these chicks were fed on a mash which has proved quite satisfactory for chicks of another breed maintained in isolation for experimental purposes.

It may be that the incidence of outbreaks throughout the country has increased since the introduction of war-time mashes, but in at least one field outbreak of so-called six-day disease investigated recently, the history and symptoms were not quite typical, agreeing more with the description given by Mr. Asplin.

As it is intended to publish shortly a communication dealing with personal investigations, the following short remarks are made with the intention of promoting discussion and of contributing some information which may prove useful.

(1) The symptoms in typical cases are, as Messrs. Temperton and Bythell remark, characteristic. The onset is very sudden; the chicks which have been apparently healthy an hour or two before, are found dead or in coma, lying on one side with the head retracted. Some affected chicks lie in this condition for four hours, evincing feeble movements only. Recovery has never been observed. A mortality rate up to 66 per cent. has been observed. Surviving chicks usually were successfully reared.

(2) *Post-mortem* appearances vary, but the present writer has found in the majority of cases a slightly swollen liver, a distended gall bladder and numerous tiny bullae of gas on the abdominal air sacs; slight enteritis is sometimes seen.

(3) Aerobic cultures made from the blood and organs often are negative, but occasionally coliform organisms, enterococci and proteus types may be isolated.

Cultures of the liver in cooked meat or other suitable medium often yield cultures of a *Cl. welchii* type of organism. Gram-positive rods resembling *Cl. welchii* may be detected in stained films of liver or air sac membrane. Further, this organism may be found in great numbers in the duodenum and other parts of the bowels.

(4) In view of this frequent infection with *Cl. welchii*, the communication published by N. Nakamura in the *Journal of the Japanese Society of Veterinary Science* (1923). Vol. 2, p. 93, might be found interesting to poultry pathologists. This author described a disease of chicks in Japan known as "Babatare," the symptoms, *post-mortem* appearances described are not unlike those of "Six-day disease"; he found the blood and organs sterile, but the bowels to contain large numbers of a *Cl. welchii* type of organism. By feeding cultures of this organism he claims to have reproduced the condition. In a later number of the same journal* a colleague, Iizuka, describes two substances produced in culture by this organism. (1) a heat labile toxin, (2) a heat stable substance which he identified as histamine. Iizuka considered that the latter substance was the more important in the pathogenesis of the disease.

(5) The present writer has succeeded in reproducing six-day disease by feeding (*a*) intestinal contents of diseased chicks to day-old chicks, (*b*) by placing day-old chicks in brooders contaminated by diseased chicks; control chicks of the same batch were reared successfully in isolation; (*c*) by feeding cultures of the strain of *Cl. welchii* isolated from typical cases of the disease. Up to the present the only toxin detected in cultures are α toxin in very small amounts and β toxin in comparatively large amounts. Histamine also is formed but not in unusually large amounts; however, the reason for this might be because the strains tested had been on artificial medium for some months.

(6) The feeding to day-old chicks of comparatively large amounts of histamine chloride in solution (40 mgms.) causes violent evacuation of faeces, uneasiness for a few hours and then paralysis; the chicks lie for several hours in a coma showing symptoms not unlike those of six-day disease but usually recover and appear fair normal. The results of the "guinea-pig intestine tests" for the presence of histamine in bowel contents, suggest that over 90 per cent. of the administered histamine is destroyed, presumably by histaminase.

(7) The suggestion is offered that six-day disease may be the result of dietetic errors followed by alteration of the intestinal flora, either in numbers or types of bacteria; the determining factor may be an intoxication caused by certain bacteria, such as the *Cl. welchii* described, or it may be invasion of the blood and organs with any organism which happens to be predominant.

(8) The writer would like to stress that his conclusions as to the aetiology of this disease are not incompatible with those of Messrs. Temperton and Bythell. Further work in which their very valuable observations will be used is intended.

(9) Finally, with regard to the "rather loose cognomen of six-day disease," to use Mr. Mayall's phrase, the writer of this letter wishes to record that he first heard the name from Mr. W. R. Kerr, of the Ministry of Agriculture, Northern Ireland, where the disease was quite well known in 1934. However, it is difficult to devise a better name until the pathogenesis of the condition has been more fully investigated. Here it might be mentioned that chicks given nothing but water from the time of hatching usually survive up to the sixth day, when, apparently, their reserves are exhausted. On *post-mortem* examination the liver and other organs are shrunken, but the gall-bladder is distended and the contents of the yolk sac may be unabsorbed. Cultures of the heart blood and liver, both aerobic and anaerobic, are negative.

Yours faithfully,

C. A. McGaughey.

Institute of Animal Pathology,
Milton Road, Cambridge.

* (1930.) 9. 123-159.

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QUESTIONS AND ANSWERS

Sir,—I cannot agree with the correspondent on the above subject in your issue of December 2nd, 1944, who infers that *Questions and Answers* should cease to be a feature in your columns.

It is my belief that *Questions and Answers* has a very wide range of readers from all the different branches of the profession and that we have here something which, if developed properly, would make interesting and instructive reading for many.

Answers should only be published to questions which may be considered to command a wide professional interest and questions should be sent in with this point in view. They should not be of such a nature that, with very little effort, the questioner could discover his answer in a text-book.

The answers furnished should be based on the most modern knowledge available.

Yours faithfully,

West Street, Oundle, Northants. Fred W. A. Smith.
December 7th, 1944.

ADVERTISER'S ANNOUNCEMENT

Hypholin Potency Correction

Owing to an error in transmission of information, the potency of Hypholin was given, in last week's issue (page 494) as equivalent to over 100 units of penicillin per c.c. This should have read "over 1,000 units."

Since this announcement the manufacturers, Watford Chemical Co., Ltd., have doubled the potency of Hypholin (Veterinary), which is now equivalent to over 2,000 units of penicillin per c.c.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
Nov. 1st to 15th, 1944...	9	22	—	29	65
Corresponding period in—					
1943 ...	9	—	1	20	34
1942 ...	16	49	—	53	12
1941 ...	8	1	—	9	18
Total Jan. 1st to Nov. 15, 1944	163	156	7	206	1,265
Corresponding period in—					
1943 ...	253	15	7	195	481
1942 ...	308	601	26	221	412
1941 ...	362	260	17	169	1,014

Note.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.